

## WEST

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File: JPAB

Feb 1, 1989

PUB-N0: JP401030224A  
DOCUMENT-IDENTIFIER: JP 01030224 A  
TITLE: PLASMA PROCESSING METHOD

PUBN-DATE: February 1, 1989

## INVENTOR-INFORMATION:

NAME	COUNTRY
HIRAO, TAKASHI	
KITAGAWA, MASATOSHI	
YOSHIDA, TETSUHISA	
FUSE, HARUHIDE	

## ASSIGNEE-INFORMATION:

NAME	COUNTRY
MATSUSHITA ELECTRIC IND CO LTD	

APPL-NO: JP62187177  
APPL-DATE: July 27, 1987

US-CL-CURRENT: 216/67  
INT-CL (IPC): H01L 21/302; H01L 21/205; H01L 21/265

## ABSTRACT:

PURPOSE: To improve the film quality of sidewall as well as the step coverage etc. in the formation of thin film by making the directivity of ion random by a method wherein deposition, etching and doping of the thin film or surface processing are performed in a specimen chamber while changing the magnetic field near the specimen chamber using a plasma device with a plasma producing chamber and the specimen chamber.

CONSTITUTION: Outer electromagnets 8 are provided outside the part near a specimen base 6 to modulate the magnetic field near the specimen base 6. The size and direction of the magnetic field are varied with time by changing the level or both the level and direction of the current fed to the electromagnets 8. For example, a part of magnetic force line 10 generated by the outer electromagnets 8 at a specified time generates the other magnetic force line 10 in the reverse direction to a divergence magnetic field 9 to modulate the magnetic field near the specimen 7. Through these procedures, the moving state of ion can be made random by changing the level and direction of current enabling the film quality e.g. in the sidewall of step difference part and other region to be equalized.

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L7: Entry 9 of 14

File: JPAB

Jul 20, 1992

PUB-NO: JP404199711A  
DOCUMENT-IDENTIFIER: JP 04199711 A  
TITLE: METHOD AND APPARATUS FOR PLASMA ETCHING

PUBN-DATE: July 20, 1992

## INVENTOR-INFORMATION:

NAME	COUNTRY
KITAGAWA, MASATOSHI	
MANABE, YOSHIO	
KIMURA, TADASHI	
YOSHIDA, TETSUHISA	
HIRAO, TAKASHI	

## ASSIGNEE-INFORMATION:

NAME	COUNTRY
MATSUSHITA ELECTRIC IND CO LTD	

APPL-NO: JP02335091

APPL-DATE: November 29, 1990

US-CL-CURRENT: 216/67  
INT-CL (IPC): H01L 21/302

## ABSTRACT:

PURPOSE: To enable a high-speed etching to be performed with a good uniformity, by varying in time the magnetic field generated with a magnet apparatus for generating magnetic fields, which is provided to satisfy an electron cyclotron resonance condition.

CONSTITUTION: A pair of electromagnets 18, 19 for generating magnetic fields, which comprises electromagnet coils, is provided. The strengths of the magnetic fields in one or both of the electromagnet coils are varied in time, and a generated plasma is guided to a substrate 41 with a high efficiency. That is, the absorption condition of electron cyclotron resonance is made to be satisfied near the substrate 41, and the gradient of the magnetic field is varied in time in the direction of the substrate 41. Thereby, ions, which are generated by a plasma decomposition and contribute to etching, are projected on the substrate 41 at a right angle to it, and even when a gas pressure is low, a high etching speed and a uniform etching can be realized.

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L2: Entry 27 of 68

File: EPAB

Nov 30, 1995

PUB-N0: WO009532315A1

DOCUMENT-IDENTIFIER: WO 9532315 A1

TITLE: MAGNETICALLY ENHANCED MULTIPLE CAPACITIVE PLASMA GENERATION APPARATUS AND RELATED METHOD

PUBN-DATE: November 30, 1995

## INVENTOR-INFORMATION:

NAME	COUNTRY
YIN, GERALD ZHEYAO	
HANAWA, HIROJI	
SMYTH, KENNETH	

## ASSIGNEE-INFORMATION:

NAME	COUNTRY
APPLIED MATERIALS INC	US

APPL-NO: US09506242

APPL-DATE: May 15, 1995

PRIORITY-DATA: US24258194A (May 13, 1994)

INT-CL (IPC): C23 C 16/00; C23 F 1/02; C23 C 14/00

EUR-CL (EPC): H01J037/32

## ABSTRACT:

CHG DATE=19990617 STATUS=0>Plasma generation apparatus, and a related method for its operation, for producing a uniform high-density plasma with good process control and process repeatability. The apparatus includes multiple side electrodes (62.1, 62.6) to which first radio-frequency (rf) power source (57) is connected to provide a transverse electric field for plasma generation, and a pair of conventional, upper and lower, electrodes (50, 52) to which a second rf power source (61) is connected to provide separate control of the plasma energy as used in a process such as dry etching. In addition, a magnetic field coil (60) provides a magnetic field perpendicular to the transverse electric field, for enhancement of plasma generation. Because the plasma is generated by a relatively lower frequency (50-200 MHz) power source, as compared with a microwave power source, the magnetic field strength needed to achieve magnetically enhanced operation at or near the electrom cyclotron resonance (ECR) condition is well under 100 gauss, which can be provided at relatively low cost. Moreover, the apparatus can be operated efficiently over a relatively wide range of chamber pressures. Ideally, the number of side electrodes used for plasma generation should be four or six, with each electrode receiving a phase delayed signal as compared with an adjacent electrode, to produce a rotating electric field that further enhances uniformity of plasma formation.

## WEST Search History

DATE: Wednesday, January 15, 2003

<u>Set Name</u>	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u>
side by side		result set	
<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
L17	L16 and ((438/\$ or 216/\$ or 219/\$ or 204/\$)!ccls.)	783	L17
L16	L15 and RF	1446	L16
L15	L14 and (varied or varying)	3282	L15
L14	L13 and magnetic	6956	L14
L13	(micromachining or etching) and plasma	40457	L13
<i>DB=PGPB; PLUR=YES; OP=ADJ</i>			
L12	L11 and simultaneous	146	L12
L11	L10 and (varied or varying)	800	L11
L10	L9 and magnetic	1680	L10
L9	(micromachining or etching) and plasma	8888	L9
<i>DB=JPAB; PLUR=YES; OP=ADJ</i>			
L8	L4 and varied	64	L8
L7	L6 and (varying or simultaneous)	14	L7
L6	L4 and magnetic	1000	L6
L5	L4 and megnetic	0	L5
L4	(micromachining or etching) and plasma	11325	L4
<i>DB=EPAB; PLUR=YES; OP=ADJ</i>			
L3	('EP 867913 A1'  'EP 849766 A2'  'EP 552491 A1')[WKU]	0	L3
L2	L1 and magnetic	68	L2
L1	(micromachining or etching) and plasma	967	L1

END OF SEARCH HISTORY